Oyster density of restored reef edge/interior in Quonochontaug Pond, RI in May 2019

Website: https://www.bco-dmo.org/dataset/881536
Data Type: Other Field Results
Version: 1
Version Date: 2022-11-02

Project
» CAREER: Linking genetic diversity, population density, and disease prevalence in seagrass and oyster ecosystems (Seagrass and Oyster Ecosystems)

Contributors	Affiliation	Role
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Abstract
This dataset represents oyster density measurements of restored reef edge/interior in Quonochontaug Pond, Rhode Island, USA determined by scuba divers in May of 2019. Reef relief and quadrat relief were calculated by subtracting water depth at each quadrat (quadrat relief) or the highest point on the reef (reef relief) from water depth on the adjacent unstructured bottom.

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Related Publications
- Related Datasets
- Parameters
- Instruments
- Project Information
- Funding

Coverage

Spatial Extent: **Lat**:41.3 **Lon**:-71.7
Temporal Extent: 2019-05-07 - 2019-05-09

Methods & Sampling

These data were published in Table S1 of Davenport et al., 2022 (Restoration Ecology).

To quantify the observed pattern of higher oyster density around the edges of reefs at Quonochontaug Pond, Rhode Island, USA, (41.3 N, 71.7 W) we surveyed oyster density and reef relief in May 2019. Divers haphazardly placed 0.25 m^2 quadrats on each oyster reef and excavated all live and recently dead oysters (N =

3-5 quadrats per reef on each of edge and interior). Live oysters were counted in the field before returning them to the reef in the same location where they were collected. Top valves were removed from recently dead oysters (open oysters with both valves present, but no live tissue) to confirm they were dead before replacing them. Divers also measured water depth with a meter stick at each quadrat, at the highest point on each reef, and at the unstructured bottom adjacent to each reef. Reef relief and quadrat relief were calculated by subtracting the water depth at each quadrat (quadrat relief) or the highest point on the reef (reef relief) from the water depth on the adjacent unstructured bottom.

Data Processing Description

BCO-DMO Processing:
- Converted dates to YYYY-MM-DD format;
- Adjusted field/parameter names to comply with BCO-DMO naming conventions;
- Added a conventional header with dataset name, PI names, and version date;
- Values in the column "quad_rel" were converted from meters to centimeters (as integers) as requested by data provider.

[table of contents | back to top]

Data Files

File
oyster_density.csv (Comma Separated Values (.csv), 1.72 KB) MD5:dea403ff1f67487f4d4c14998c0fdd5a Primary data file for dataset ID 881536

[table of contents | back to top]

Related Publications

Davenport, T. M. (2022). Reef and landscape characteristics influence nekton recruitment enhancement by restored oyster reefs. https://doi.org/10.17760/D20439250
General

Davenport, T. M., Grabowski, J. H., & Hughes, A. R. (2022). Edge effects influence the composition and density of reef residents on subtidal restored oyster reefs. Restoration Ecology. Portico. https://doi.org/10.1111/rec.13693
Results

[table of contents | back to top]

Related Datasets

IsRelatedTo

Hughes, A. R., Davenport, T., Grabowski, J. (2022) **Daily temperature measurements on restored oyster reefs in Quonochontaug Pond, RI from July-August 2018 and September-October 2018.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-11-01 doi:10.26008/1912/bco-dmo.881834.1 [view at BCO-DMO]

Hughes, A. R., Davenport, T., Grabowski, J. (2022) **Faunal ID, size and biomass on oyster reefs in Quonochontaug Pond, RI from July-August 2018 and September-October 2018.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-11-02 doi:10.26008/1912/bco-dmo.881801.1 [view at BCO-DMO]

[table of contents | back to top]

Parameters

Parameter	Description	Units
block	Numerical label for experimental block 1-3; corresponds to Figure 1 in Davenport et al. 2022 Restoration Ecology	unitless
reef	Alphabetical label for the reef on which trays with HOBO loggers were attached; corresponds to Figure 1 in Davenport et al. 2022 Restoration Ecology	unitless
treat	Experimental treatment including I (reef interior) and E (reef edge). Corresponds to Figure 1 in Davenport et al. 2022 Restoration Ecology	unitless
date	Date oyster density was sampled in format: YYYY-MM-DD	unitless
quadrat	Numerical label for quadrat selected for sampling. Quadrats were haphazardly placed and 3 quadrats each were selected from edge and interior from which to quantify oyster density at reef edge and interior	unitless
depth	Depth of bottom measured in centimeters by divers at the time of sampling	centimeters (cm)
oys_quad_dens	Live oyster density per 0.25 m2 quadrat	unitless
reef_relief	Reef height off the bottom as measured by divers	centimeters (cm)
quad_rel	Height of sampling quadrat off the bottom as measured by divers	centimeters (cm)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	meter stick
Generic Instrument Name	ruler
Dataset-specific Description	A meter stick was used to measure water depth.
Generic Instrument Description	A device used for measuring or for drawing straight lines, consisting of an elongated piece of rigid or semi-rigid material marked with units for measurement. Device that allows one or more physical dimensions of a sample or specimen to be determined by visible comparison against marked graduations in units of measurement of dimension length.

Dataset-specific Instrument Name	SCUBA
Generic Instrument Name	Self-Contained Underwater Breathing Apparatus
Generic Instrument Description	The self-contained underwater breathing apparatus or scuba diving system is the result of technological developments and innovations that began almost 300 years ago. Scuba diving is the most extensively used system for breathing underwater by recreational divers throughout the world and in various forms is also widely used to perform underwater work for military, scientific, and commercial purposes. Reference: https://oceanexplorer.noaa.gov/technology/technical/technical.html

[table of contents | back to top]

Project Information

CAREER: Linking genetic diversity, population density, and disease prevalence in seagrass and oyster ecosystems (Seagrass and Oyster Ecosystems)

Coverage: Coastal New England

NSF Award Abstract:
Disease outbreaks in the ocean are increasing, causing losses of ecologically important marine species, but the factors contributing to these outbreaks are not well understood. This 5-year CAREER project will study disease prevalence and intensity in two marine foundation species - the seagrass Zostera marina and the Eastern oyster Crassostrea virginica. More specifically, host-disease relationships will be explored to understand how genetic diversity and population density of the host species impacts disease transmission and risk. This work will pair large-scale experimental restorations and smaller-scale field experiments to examine disease-host relationships across multiple spatial scales. Comparisons of patterns and mechanisms across the two coastal systems will provide an important first step towards identifying generalities in the diversity-density-disease relationship. To enhance the broader impacts and utility of this work, the experiments will be conducted in collaboration with restoration practitioners and guided by knowledge ascertained from key stakeholder groups. The project will support the development of an early career female researcher and multiple graduate and undergraduate students. Students will be trained in state-of-the-art molecular techniques to quantify oyster and seagrass parasites. Key findings from the surveys and experimental work will be incorporated into undergraduate courses focused on Conservation Biology, Marine Biology, and Disease Ecology. Finally, students in these courses will help develop social-ecological surveys and mutual learning games to stimulate knowledge transfer with stakeholders through a series of workshops.

The relationship between host genetic diversity and disease dynamics is complex. In some cases, known as a dilution effect, diversity reduces disease transmission and risk. However, the opposite relationship, known as the amplification effect, can also occur when diversity increases the risk of infection. Even if diversity directly reduces disease risk, simultaneous positive effects of diversity on host density could lead to amplification by increasing disease transmission between infected and uninfected individuals. Large-scale field restorations of seagrasses (Zostera marina) and oysters (Crassostrea virginica) will be utilized to test the effects of host genetic diversity on host population density and disease prevalence/intensity. Additional field experiments independently manipulating host genetic diversity and density will examine the mechanisms leading to dilution or amplification. Conducting similar manipulations in two marine foundation species - one a clonal plant and the other a non-clonal animal - will help identify commonalities in the diversity-density-disease relationship. Further, collaborations among project scientists, students, and stakeholders will enhance interdisciplinary training and help facilitate the exchange of information to improve management and restoration efforts. As part of these efforts, targeted surveys will be used to document the perceptions and attitudes of managers and restoration practitioners regarding genetic diversity and its role in ecological resilience and restoration.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1652320

[table of contents | back to top]